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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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John S. Beulick Armstrong Teasdale LLP Suite 2600 One Metropolitan Square St. Louis, MO 63102		EXAMINER KIM, TAE JUN		
		ART UNIT 3746 PAPER NUMBER		
DATE MAILED: 12/15/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Period for Reply

Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.

Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 08/06/2004.
- 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) ☐ Notice of Informal Patent Application (PTO-152)
 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 50 (see Fig. 3 and bottom of page 4).
2. The drawings are further objected to for failing to correspond with the specification. The following problems have been identified for Figs. 3 and 4:

“[0019] **FIG. 3** is a side view of an exemplary noise suppression system 50 that can be used with gas turbine engine 10. **FIG. 4** is a perspective view of noise suppression system 50. In an exemplary embodiment, noise suppression system 50 is operably coupled to core engine exhaust nozzle 35. Noise suppression system 50 includes a manifold 52 coupled to core engine exhaust nozzle 35 **(the manifold element number is drawn to the fan exhaust nozzle for 52 and not the core nozzle 35, the valve 56, etc. are all indicated in the drawings only for the fan nozzle and not the core nozzle 35)** such that manifold 52 circumscribes core engine exhaust nozzle 35. Compressed air is discharged from an air source 54 through an actuation valve 56 into manifold 52. In the exemplary embodiment, air is supplied to manifold 52 from at least one of fan assembly 12, high pressure compressor 14, high pressure turbine 18, or low pressure turbine 20.

[0020] Noise suppression system 50 also includes a plurality of tubes 60 coupled to manifold 52 and operated such that air is discharged from manifold 52 through plurality of tubes 60 and into a core engine exhaust stream 85. In other embodiments, noise suppression system 50 does not utilize tubes 60, but rather air is discharged into core engine exhaust stream 85 through other means. Accordingly, each tube 60 includes an upstream end 62, a downstream end 64, and a length 66 that is measured between upstream end 62 and downstream end 64, respectively. In the exemplary embodiment, length 66 is sized such that upstream end 62 is coupled to manifold 52 and downstream end 64 is coupled to an end 68 of engine exhaust nozzle 35. In the exemplary embodiment, tubes 60 are arranged in tube pairs 70 wherein each tube pair 70 includes a first tube 72 and a second tube 74. Moreover, in the exemplary embodiment, length 66 enables each tube 60 to extend approximately one-quarter of the way across each respective chevron 44 towards an aft end of each chevron 44.

[0021] In the exemplary embodiment, noise suppression system 50 includes eight pairs 70 of tubes 60 arranged azimuthally around an outer periphery of engine exhaust nozzle 35. In an alternative embodiment, noise suppression system 50 includes a plurality of tubes 60 that are not paired. In another alternative embodiment, noise suppression system 50 includes more or less than eight pairs 70 of tubes 60. In the exemplary embodiment, each tube 60 is substantially hollow, has a substantially circular cross-sectional profile,

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and includes an opening 76 that extends along length 66 of tube 60. Alternatively, tube 60 does not have a circular cross-sectional profile. In the exemplary embodiment, noise suppression system 50 includes four pairs 70 of tubes 60 arranged azimuthally around an outer periphery of core engine exhaust nozzle 35. Tubes 72 and 74 oriented approximately parallel to each other and a centerline axis 82. Furthermore, each tube pair 70 is oriented at an injection angle 80 that is measured with respect to a centerline axis 82. Although noise suppression system 50 is shown as coupled to an outer periphery of core engine exhaust nozzle 35, it should be realized that noise suppression system 50 could also be coupled to an inner periphery of core engine exhaust nozzle 35."

Furthermore, in Fig. 3, the tubes 70 are not shown with **triangular chevrons** on the fan exhaust nozzle 30. The following paragraphs make it clear that the tubes are to be used on both sides of the chevrons but this is not properly illustrated for the fan nozzle 30.

"[0029] The above-described noise suppression system includes a manifold and plurality of pairs of hollow injection tubes, i.e. "jets", coupled to the manifold, wherein each pair of tubes discharges air across a plurality of chevrons 44 coupled to either the core engine nozzle or the fan nozzle. More specifically, the above-described noise suppression system includes a manifold and plurality of pairs of hollow tubes that are oriented at a complex angle, i.e. angle 80, wherein each tube has a predetermined opening such that the air discharged across the plurality of chevrons 44, has an injection velocity, a relative velocity and a mass-flow-rate that are variably selected to simulate a mechanical chevron. The injection tubes are positioned azimuthally around either the core engine nozzle or the fan nozzle to facilitate increasing the effectiveness of the chevron mixing effect within the engine shear layer and delaying formation of small scale turbulence."

"BRIEF DESCRIPTION OF THE INVENTION

[0005] In one aspect, a method for operating a gas turbine engine is provided. The method includes channeling compressed air from the gas turbine engine to a noise suppression system, and selectively operating the noise suppression system such **that air discharged from the noise suppression system generates a streamwise vortex downstream from each respective chevron.**

[0006] In another aspect, an assembly for a gas turbine engine is provided. The assembly includes a gas turbine nozzle, a plurality of chevrons coupled to the gas turbine nozzle, and a noise suppression system coupled to the gas turbine nozzle, wherein the noise suppression system is selectively operable to facilitate generating **a streamwise vortex downstream from each respective chevron.**

[0007] In a further aspect, a gas turbine engine is provided. The gas turbine engine includes a core engine nozzle, a fan nozzle, a plurality of chevrons coupled to at least one of the core engine nozzle and the fan nozzle, and a noise suppression system coupled to at least one of the core engine nozzle and the fan nozzle, wherein the noise suppression

system is selectively operable to facilitate **generating a streamwise vortex downstream from each respective chevron.**”

For Figure 5, 6, the tubes 70 are not shown with **triangular chevrons** on the fan exhaust nozzle 30. The following paragraphs make it clear that the tubes are to be used on both sides of the chevrons but this is not properly illustrated for the fan nozzle 30.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 5, line 4 is objected to because of the following informalities: “a single of vortex” is grammatically incorrect. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 8, 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Bhat (4,280,587). Bhat teaches an assembly for a gas turbine engine, said assembly comprising: a gas turbine nozzle; a plurality of chevrons 18' (Figs. 30-35) coupled to said gas turbine nozzle; and a noise suppression system coupled to said gas turbine nozzle, said noise suppression system is selectively operable by actuators J to inherently facilitate enhancing a streamwise vortex generated downstream from each respective chevron, note the position of the actuators selectively controls the amount of noise reduction and inherently controls the strength of the streamwise vortex generated downstream from each chevron. A gas turbine engine comprising: a core engine nozzle 16 (see Fig. 30); a fan nozzle 17 (see Fig. 30); a plurality of chevrons 18' coupled to at least one of said core engine nozzle and said fan nozzle; and a noise suppression system coupled to at least one

of said core engine nozzle and said fan nozzle, said noise suppression system is selectively operable to inherently facilitate enhancing a streamwise vortex generated downstream from each respective chevron.

6. Claims 8, 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Nesbitt et al (6,718,752). Nesbitt et al teach an assembly for a gas turbine engine, said assembly comprising: a gas turbine nozzle; a plurality of chevrons 64 coupled to said gas turbine nozzle; and a noise suppression system coupled to said gas turbine nozzle, said noise suppression system 68 (see col. 1, lines 48-col. 2, line 36) is selectively operable to facilitate enhancing a streamwise vortex which is inherently generated downstream from each respective chevron. A gas turbine engine comprising: a core engine nozzle; a fan nozzle; a plurality of chevrons 64 coupled to at least one of said core engine nozzle and said fan nozzle; and a noise suppression system 68 (see col. 1, lines 48-col. 2, line 36) coupled to at least one of said core engine nozzle and said fan nozzle, said noise suppression system is selectively operable to facilitate enhancing a streamwise vortex which is inherently generated downstream from each respective chevron.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 8, 14, 15, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Matthews et al (6,314,721), Nesbitt et al (6,718,752) and Hebert (6,826,901) in view of Motsinger (3,527,317). Matthews et al, Nesbitt et al and Hebert all teach a gas turbine nozzle (either the fan or core or both) with a plurality of chevrons but do not teach selectively used noise suppression system to facilitate enhancing a streamwise vortex generated downstream from each chevron. Motsinger teaches a noise suppression system coupled to said gas turbine nozzle, said noise suppression system is selectively operable by a valve (see Figs. 3-5 and e.g. col. 5, lines 21-27). The noise suppression system will inherently enhance the streamwise vortex from each chevron.

9. Claims 1- 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Matthews et al (6,314,721), Nesbitt et al (6,718,752) and Hebert (6,826,901) in view of Lilley (2,990,905) and Motsinger (3,527,317). Matthews et al, Nesbitt et al and Hebert all teach a gas turbine nozzle (either the fan or core or both) with a plurality of chevrons but do not teach selectively used noise suppression system to facilitate enhancing a streamwise vortex generated downstream from each chevron. Lilley teaches a noise reduction system including manifold 2 and tubes 3, 3A which generate vortices/eddies (col. 3, lines 1-19) in a manner similar to teeth or corrugations (note that chevrons are merely triangular teeth or corrugations) and using tube pairs with first and second tubes that are angled inwardly (Fig. 1) at the same angle toward the centerline. The fluid can be compressed air from the engine (col. 2, lines 42+). It would have been obvious to one of ordinary skill in the art to employ tube pairs to angled with an angle β to facilitate

generating a streamwise vortices and/or enhance the available noise reduction. Motsinger teaches using a valve to selectively operate the noise reduction system. It would have been obvious to one of ordinary skill in the art to employ a valve to selectively operate the noise reduction system in order to use the noise reduction system only when needed, e.g. in areas where people reside to hear the noise and/or to utilize the engine air for maximum thrust and thus reduce flow and/or thrust losses associated with bleeding the engine air. As for the number of tube pairs being exactly 8, this is deemed an obvious matter of finding the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ exactly 8 tube pairs as an obvious matter of finding the workable ranges in the art.

Potentially Allowable Subject Matter

10. Claim 10 would be favorably considered if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to further specify that each tube pair is located on respective angled sides of each chevron.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.


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The fax numbers for the organization where this application is assigned are

571-273-8300 for Regular faxes and 571-273-8300 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thorpe, can be reached at 571-272-4444.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist of Technology Center 3700, whose telephone number is 703-308-0861. General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at <http://www.uspto.gov/main/patents.htm>

	
Ted Kim	Telephone 571-272-4829
Primary Examiner	Fax (Regular) 571-273-8300
December 12, 2005	Fax (After Final) 571-273-8300
Technology Center 3700 Receptionist	Telephone 703-308-0861
Patents Assistance Center	Telephone 800-786-9199